

TABLE 3A.—Free-air resultant winds based on rawin observations made near 0300 G. C. T., during the year 1949. Directions given in degrees from north (N=360°, E=90°, S=180°, W=270°). Speeds in meters per second

Altitude (meters) m. s. l.	Albuquerque, N. Mex. (1,636 m.)			Big Spring, Tex. (774 m.)			Bismarck, N. Dak. (505 m.)			Brownsville, Tex. (7 m.)			Caribou, Maine (191 m.)			Charleston, S. C. (13 m.)			Columbia, Mo. (237 m.)			Grand Junction, Colo. (1,473 m.)			Greensboro, N. C. (275 m.)			Hatteras, N. C. (3 m.)			International Falls, Minn. (358 m.)			Little Rock, Ark. (80 m.)			Medford, Oreg. (401 m.)			
	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed				
Surface.....	365	131	1.2	362	141	3.1	363	16	0.8	361	118	2.5	365	267	1.5	365	210	0.4	364	145	0.7	365	60	0.2	364	282	0.3	365	245	0.7	365	246	0.7	365	218	0.4	364	323	1.6	
500.....	364	105	3.5	362	159	4.9	358	300	2.1	355	130	5.9	365	265	4.4	363	219	2.0	364	198	2.6	365	60	0.2	364	282	0.3	365	245	0.7	365	246	0.7	365	218	0.4	364	323	1.6	
1,000.....	364	105	3.5	362	159	4.9	358	300	2.1	354	140	5.2	365	274	6.1	361	236	2.5	361	234	4.0	360	251	3.6	360	250	3.3	362	263	4.1	359	214	3.1	359	300	2.0				
1,500.....	364	99	2.4	364	214	4.7	363	291	4.2	353	152	3.8	360	275	7.2	360	256	3.3	360	252	5.3	363	60	2.3	358	261	4.7	353	261	4.1	359	231	5.3	356	233	4.1	357	276	2.1	
2,000.....	364	105	1.7	360	214	4.7	363	299	6.0	354	172	2.8	355	275	9.7	360	263	4.1	358	264	6.4	363	230	1.1	357	266	5.6	347	268	5.0	359	261	6.5	353	245	6.1	355	260	2.6	
2,500.....	364	254	3.6	360	234	5.0	361	293	7.5	354	193	2.5	348	274	9.7	357	268	5.1	355	270	7.3	363	235	2.4	356	270	6.8	343	267	6.0	356	285	7.7	345	251	6.1	348	259	3.8	
3,000.....	362	259	4.7	360	248	5.6	350	293	8.8	351	213	2.7	346	271	11.1	353	268	6.0	351	274	8.1	364	245	3.6	354	269	7.9	337	268	7.0	356	288	9.0	342	255	7.3	347	256	4.5	
4,000.....	361	265	6.5	358	262	6.8	344	291	11.1	349	242	3.9	336	270	13.0	344	268	7.4	342	279	9.6	362	260	5.3	346	260	9.7	322	268	9.2	343	283	11.4	332	259	9.0	342	267	6.0	
5,000.....	354	269	7.6	348	263	8.3	338	287	12.4	352	247	5.5	320	268	15.1	329	268	8.6	330	278	11.6	357	265	7.2	340	270	11.4	312	271	10.7	330	281	13.9	323	262	10.1	328	272	7.9	
6,000.....	344	272	8.8	332	260	8.8	330	282	14.1	347	251	7.1	305	268	16.8	311	270	9.5	316	277	12.9	351	269	9.0	331	273	12.7	292	273	11.8	319	276	15.4	307	260	11.3	304	272	8.8	
8,000.....	300	273	10.1	309	261	11.9	289	271	16.3	335	255	10.8	256	268	18.8	265	276	10.5	270	271	14.9	305	272	11.4	291	272	15.4	249	277	13.0	278	273	18.1	274	254	14.3	241	258	10.9	
10,000.....	256	274	12.3	---	---	---	243	264	17.3	296	261	13.6	---	---	---	223	281	11.5	---	---	---	236	271	12.8	237	274	16.6	182	282	12.1	221	274	20.1	---	---	---	---	---	---	
12,000.....	---	---	---	---	---	---	---	---	---	216	270	12.3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

	Miami, Fla. (12 m.)			Nantucket, Mass. (13 m.)			Nashville, Tenn. (180 m.)			New Orleans, La. (6 m.)			Oakland, Calif. (8 m.)			Oklahoma City, Okla. (392 m.)			Rapid City, S. Dak. (930 m.)			St. Cloud, Minn. (318 m.)			San Antonio, Tex. (242 m.)			San Juan, P. R. (28 m.)			Santa Maria, Calif. (72 m.)			Sault Ste. Marie, Mich. (221 m.)			Spokane, Wash. (726 m.)				
	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed	Observations	Direction	Speed		
Surface.....	365	80	1.2	352	257	1.2	365	208	0.5	363	113	0.8	365	277	3.0	353	138	2.0	359	295	0.9	362	322	0.4	364	93	2.6	364	98	2.9	365	281	1.6	362	306	0.6	357	205	1.7		
500.....	364	105	3.5	349	262	4.7	363	297	2.2	360	144	1.9	364	288	3.1	364	150	2.6	359	290	3.5	359	238	1.1	364	119	4.2	361	90	6.6	364	331	2.7	362	250	1.8	357	241	4.2		
1,000.....	364	105	3.5	349	262	4.7	363	297	2.2	360	144	1.9	364	288	3.1	364	150	2.6	359	290	3.5	359	238	1.1	364	119	4.2	361	90	6.6	364	331	2.7	362	250	1.8	357	241	4.2		
1,500.....	364	99	2.4	346	274	5.4	362	228	4.6	358	208	1.3	364	289	2.8	329	192	4.0	356	291	3.0	349	267	5.1	364	143	4.5	359	89	6.6	364	337	2.6	358	259	4.4	354	222	3.1		
2,000.....	364	105	1.7	360	214	4.7	363	299	6.0	354	172	2.8	355	275	9.7	360	263	4.1	358	264	6.4	363	230	1.1	357	266	5.6	347	268	5.0	359	261	6.5	353	245	6.1	355	260	2.6		
2,500.....	365	127	1.1	337	271	9.2	353	263	7.2	352	248	3.5	363	294	2.1	333	248	5.1	355	290	4.5	344	273	6.3	364	210	3.1	355	87	5.2	362	341	2.1	346	278	7.0	348	251	4.7		
3,000.....	365	169	6.3	333	270	10.3	350	267	8.8	351	254	4.5	361	291	3.3	334	262	6.8	345	287	7.6	341	285	8.5	357	248	4.5	352	85	4.8	361	304	3.7	335	276	0.5	334	267	5.6		
4,000.....	360	248	1.5	322	269	12.3	342	271	10.7	344	259	7.0	356	290	4.6	330	266	7.7	322	284	9.9	333	282	10.6	356	256	6.4	349	80	3.8	357	293	5.4	321	279	12.0	326	269	7.7		
5,000.....	356	269	3.3	304	268	14.1	329	270	12.1	335	261	9.2	346	289	5.9	325	260	8.6	309	283	11.2	324	278	12.6	347	259	8.3	344	66	2.5	351	284	7.0	301	282	13.4	314	272	9.8		
6,000.....	354	274	4.8	283	269	15.0	309	270	12.8	322	262	11.0	332	290	7.7	320	271	12.3	299	280	13.0	309	278	13.3	332	260	10.0	336	48	2.0	341	285	8.2	273	279	14.6	293	272	10.6		
8,000.....	341	279	8.6	178	272	17.5	257	268	14.6	278	263	13.3	295	280	9.7	275	271	12.3	258	357	9.5	269	276	15.9	294	264	13.1	322	299	3.5	316	280	9.7	---	---	---	---	---	---		
10,000.....	321	281	9.7	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
12,000.....	280	282	11.8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	
14,000.....	203	297	9.8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	

	Tatoosh Island, Wash. (33 m.)			Tatoosh Island, Wash. (33 m.)		
	Observations	Direction	Speed	Observations	Direction	Speed
Surface.....	351	166	1.5	---	---	---
500.....	344	229	2.2	---	---	---
1,000.....	338	236	2.0	---	---	---
1,500.....	337	239	3.4	---	---	---
2,000.....	338	240	4.1	---	---	---
2,500.....	336	257	4.9	---	---	---
3,000.....	331	262	5.9	---	---	---
4,000.....	321	264	7.8	---	---	---

on the 18th and 19th delayed as well as contributed to the crests downstream and slowed down the fall upstream.

Sharp rises occurred in all the southern tributaries of the Ohio River but no flooding occurred except in the Little Kanawha at Glenville, W. Va. A considerable rise followed on the Ohio River. Dam 29 rose from a pool condition at 15 feet to a crest of 36 feet in 3 days, but flood stages were not exceeded anywhere on the Ohio River.

On the 22d and 23d rains averaging over 2 inches covered the upper Wabash. These were followed by additional rain of about an inch over the entire basin on the 26th and 27th. The combined effect of these two storms produced moderate flooding at Wabash, Ind., and at all points from LaFayette, Ind., downstream to Mt. Carmel, Ill. Moderate rises occurred on practically all other tributaries, but no flooding occurred. No serious damage resulted, but some county and low lying State roads in the area from LaFayette, Ind., downstream were inundated for a short period. Rains were much lighter over the East and West Forks of the White but no flooding occurred except at Edwardsport, Ind.

*Lower Mississippi Basin.*—Heavy rains (about 3 inches) near the middle of the month over the St. Francis Basin caused rises to within a few feet of flood stage at Fisk, Mo., and St. Francis, Ark. Additional rain on the 18th, 22d and 26th caused an additional rise at St. Francis, Ark., to above flood stage on the 29th which continued into January.

Heavy rains on the 10th and 12th caused light flooding on the Coldwater River at Sarah, Miss., on the 12th and 13th. Little if any damage occurred as a result of the overflow.

Rains over the Mississippi Valley were sufficient to cause a rise of approximately 20 feet at stations on the Mississippi River during the last half of the month but no flooding occurred.

*West Gulf of Mexico drainage.*—Light flooding occurred on the Sabine River at Bon Weir, Tex., on the 19th and 20th due to heavy rain on the 17th. The river was about 4 feet below bankfull stage before this rain occurred.

The Trinity approached within one foot of bankfull stage at Liberty, Tex., on the 16th from the rain (2 to 3 inches) between the 9th and 15th in the lower Trinity basin.

*Puget Sound and Washington Coast drainage.*—Light overflows occurred along the Chehalis and streams in the Puget Sound drainage from the heavy rain and melting snows during the last week in December. Rains occurred almost daily over western Washington from the 23d to the end of the month with excessive amounts ranging up to 1.5 inches on the 27th and 2.85 inches on the 28th in some basins. The snow line was estimated to be between 500 and 1,000 feet. Snowmelt was a considerable factor.

According to State Highway Department reports, the snow depth on Snoqualmie Pass decreased from 80 inches on the 27th to 53 inches on the 28th and on Stevens Pass from 110 inches on the 27th to 90 inches on the 28th. Temperatures in the lower valleys reached 50°–56° from the 27th to the 29th and temperatures were slightly above freezing up to about 4,000 feet during this period. Colder weather and less rain on and after the 29th halted this serious flood threat.

## FLOOD STAGE REPORT FOR DECEMBER 1949

River and station	Flood stage	Above flood stages—dates		Crest <sup>1</sup>	
		From—	To—	Stage	Date
ATLANTIC SLOPE DRAINAGE					
Perkiomen Creek: Graters Ford, Pa. ....	<i>Feet</i> 8	27	27	<i>Feet</i> 10.2	27
MISSISSIPPI SYSTEM					
<i>Upper Mississippi Basin</i>					
Illinois: Morris, Ill. ....	13	23	23	13.8	23
Meramec:					
Sullivan, Mo. ....	11	23	23	12.0	23
Pacific, Mo. ....	11	23	24	13.5	24
<i>Ohio Basin</i>					
Little Kanawha: Glenville, W. Va. ....	23	13	13	23.1	13
Barren: Bowling Green, Ky. ....	28	13	16	36.9	14
Rolling Fork: Boston, Ky. ....		13	17	44.5	15
Green:					
Mundfordville, Ky. ....	28	13	16	36.4	15
Lock No. 6, Brownsville, Ky. ....	28	12	18	40.7	15
Lock No. 4, Woodbury, Ky. ....	33	12	22	46.7	16
Lock No. 2, Rumsey, Ky. ....	34	15	29	41.1	23
West Fork: Edwardsport, Ind. ....	12	13	13	12.2	13
Wabash:		23	30	13.8	24
Wabash, Ind. ....	12	22	23	14.8	22
Lafayette, Ind. ....	11	22	25	17.5	23
Covington, Ind. ....	16	23	30	20.6	25
Montezuma, Ind. ....				21.1	27
Terre Haute, Ind. ....	14	23	(?)	17.8	27
Hutsonville, Ill. ....				20.9	29
Vincennes, Ind. ....	16	29	(?)	17.5	31
<i>Lower Mississippi Basin</i>					
Coldwater: Sarah, Miss. ....	18	12	13	19.2	13
St. Francis: St. Francis, Ark. ....	18	29	(?)	18.5	31
WEST GULF OF MEXICO DRAINAGE					
Sabine: Bon Weir, Tex. ....	17	19	20	17.3	19
PACIFIC SLOPE DRAINAGE					
<i>Chehalis Basin</i>					
Satsop: Satsop, Wash. ....	34	28	28	34.8	28
Chehalis:					
Centralia, Wash. ....	63	28	29	64.7	28
Grand Mound, Wash. ....	14.5	29	29	14.8	29
<i>Puget Sound</i>					
Snohomish: Snohomish, Wash. ....	23.6	28	28	26.6	28
Snoqualmie: Tolt, Wash. ....	51.5	28	28	53.7	28
Stillaguamish: Arlington, Wash. ....	16	28	28	17.9	28

<sup>1</sup> Provisional.

<sup>2</sup> Continued at end of month.